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Research Laboratory

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Subject: Transparentizing of PoroMat Processed Film Using Steam Treatment
(Technical Investigation No. 203)

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Manager, Photo Science Lab

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The film used for all of the testing was Panatomic -X Type 5060 exposed in the E. G. G. sensitometer at 1/100 sec. with a 2.1 neutral density filter in place.

D-76 developer was used as a control developer and 2251-49-2 monobath was used for PoroMat processing.

Processing Procedure:

A. D-76

The D-76 control solution was mixed from the formula in the Photo Lab Index. The Panatomic-X was processed using a Nikor tank and reel. The film was developed for 7 min. with 30 sec. initial agitation and 5 sec. every 30 sec. until completion. The film was fixed in Eastman Rapid fix with hardener for 5 min. using the agitation as above. A 10 min. wash in running 70°F water followed processing and the film was air dried at room temperature. All solutions were at 70°F ± 1°F.

B. 2251-49-2 Monobath

A 100 ft. roll of PoroMat was imbibed with 2251-49-2 in the vacuum under 1 inch of Hg.

The 35 mm x 5 ft. rolls were wound on the 35mm winder with solution (2251-49-2) dripping on the supply roll. The 35mm rolls were sealed in poly and foil bags.

The Panatomic-X Type 5060 was processed in the PoroPak processor for 10 min. followed by a 10 min. wash at 70°F. All tests were run at 72°F ± 2°F.

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Treatments of the PoroMat Processed Film

A. Processed PoroMat film, after the 10 min. wash and excess water removed(with squeege), was subjected to one of the following treatments:

1. Hot Air: Forced hot air from a blower type heater is used directly on the emulsion surface at close range until the emulsion is dry.

2. Air Dried at room temperature.

3. Steam-Air Dry: The sample is placed in the steam so the emulsion faces the steam and is in the steam until a reverse curl occurs. Air dry at room temperature.

4. Steam-Hot Air Dry: The sample is placed in the steam so the emulsion faces the steam and is in the steam until a reverse curl occurs. Forced hot air from a blower type heater is then used directly on the emulsion surface at close range until the film is dry.

B. Processed PoroMat Film after the 10 min. wash, excess water removed (with squeege) and air dried at room temperature was subjected to one of the following treatments:

1. Treat as in No. 3 above.

2. Treat as in No. 4 above.

Tests Performed

Four tests were run to determine if the six treatments affected the image characteristics of the final processed and washed Panatomic-X film.

A. Accutance

A razor blade was placed on the sensitometer in contact with the Panatomic-X film. The film was exposed to produce three densities upon processing. The densities produced were: D-76 - 0.70 = D1
1.40 = D2
2.00 = D3

2251-49-2 Monobath 0.80 = D1
1.40 = D2
2.00 = D3

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A microdensitometer was used to trace across one edge of the razor blade image to determine if the treatments affected the edge tracing. The microdensitometer used was the Ansco Model 4 Automatic recording Microdensitometer. An effective aperture of 19$\mu$ and a scale of 4" = .3mm was used to make the tracings.

Each density of the 2251-49-2 PoroMat processed film was subjected to each one of the six treatments. These were compared to the control and to each other.

B. Resolution

Resolution targets were projection printed on to Panatomic-X Type 5060 by the Calibration Lab. Test exposures were run to determine optimum resolution when using D-76 processing as per the processing procedure. When the optimum exposure and focus were obtained, the PoroMat processed film was subjected to each one of the six treatments.

C. Photo Micrographs

Photo micrographs were made using the Leitz phase Contrast Transmission microscope at 150x magnification. The microscope was fitted with a Polaroid Camera. Transmission photo micrographs were taken of the three density levels after being subjected to each one of the six treatments. Reflection photo micrographs were also taken of certain treatments and the control.

D. Prints

Prints were made from negatives taken of an IRE Facsimile Test Chart. A Minolta 35mm with a Rokkor PF 1:1.8 45mm lens was set up 3 ft. from the test target. Exposure was 1/8 sec. at $f$5.6.

The negatives were processed in D-76 control and 2251-49-1 PoroMat monobath. The PoroMat processed film was subjected to each one of the six treatments. A selected frame from each treatment and the control was enlarged to approx. 16" x 20". Each picture was printed on the same grade paper and the best possible print of each negative was made. These prints were compared to the control (D-76) and to each other to see if the treatments affected print quality.

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Results of Tests

A. Accutance

The results of the microdensitometer traces showed that all the edge tracings were the same. This includes the D-76 traces. There were differences between the density levels used, but not between treatments.

B. Resolution

The D-76 processing produces a resolution of 147 1/mm. The PoroMat processed resolution targets produced 117 to 131 1/mm. Although the resolution varied over the six treatments on the PoroMat processed film only a difference of one resolution group was involved. Resolution was not affected by the treatments.

C. Photo Micrographs

The transmission photo micrographs showed no changes due to the treatments.

The reflection photo micrographs did show some differences when compared to the D-76 and to each other. All of the PoroMat processed film, regardless of treatment, showed some high spots or peaks. The D-76 processed film showed no deformation. The treatment A2 showed the most roughness while the B-1 and B-2 showed the least amount of deformation.

These results seem to bear out the theory that the opacity in PoroMat processed film is due largely to surface effects rather than non fixation.

D. Prints

The D-76 processed negative produced prints of higher contrast than the PoroMat processed negatives. The PoroMat processed negatives produced prints that were somewhat more grainy than the D-76 control prints. All the treated PoroMat processed negatives produced prints that were almost identical indicating that the treatments did not affect print quality.

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Conclusions:

The theory that surface nonuniformity caused PoroMat processed negatives to be opalescent is borne out after studying the reflection photo micrographs. The visual improvement in the transparentizing of the negatives using treatments A1, A3, A4, B1 and B2 did not affect Accutance, Resolution, Graininess or Print Quality. It seems that only the surface of the emulsion is involved in the opalescent appearance of the PoroMat processed emulsions and transparentizing does not effect the internal image quality.

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